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Commissioner James Boyd
California Energy Commission (CEC)
Attn: Docket No. 06-AFP-1
1516 Ninth St., MS-4
Sacramento, CA 95814-5512

Re: **Alternative Fuels Plan – Docket# 06-AFP-1**

Dear Commissioner Boyd;

I have reviewed the general scope of the “State Plan to Increase the Use of Alternative Transportation Fuels” (Alternative Fuels Plan). This is a timely document that can provide direction to increasing renewable and alternative fuel use in California while reducing petroleum dependence and greenhouse gas emissions.

I have several observations relevant to the scoping document. They are as follows:

1) Currently most of the ethanol fuel blended into California gasoline is derived from Midwest corn. That may change as other feedstocks are evaluated and pursued from both in State sources or even from overseas. Biodiesel is such an example as it is now being made from several feedstocks that include in-State animal fats, Midwest soybeans and Southeast Asian palm oil. As such, any “fuel-cycle” assessment will be incomplete if it does not take into account the diversity of supplies that are or could be used in California vehicles. In some cases these sources of supply may even be blended together before final distribution. Reflecting this diversity of feedstocks in the “Plan” will be difficult and sources will likely change over time. As such, the “Plan” needs to be both robust and thorough (replacing diesel with palm oil from clear cut rain forest is not a good tradeoff).

2) The characteristics of a specific biofuel of a given blend vary considerably. The level of NOx emissions from biodiesel fuel, for example, is different if based on 20% versus a 5% blend. Even within the vegetable oil category there may be differences between say canola and soybeans. More importantly, the emission profile is dependent not only fuel formulation but also on the opportunity for mitigating impacts with new formulations. As an example, my organization is working with a company that has a biodiesel fuel/additive that lowers NOx emissions. That product is now undergoing CARB verifications but there are others already on the market. It may be useful to recognize that the “status quo” formulations are changing and there are “boutique” fuels that are entering the market place that will enhance the environmental attributes. CARB and CEC have an important role to play providing incentives for these “optimized” biofuels. Unfortunately, there is a perception, and it seems to be ubiquitous, that CARB has been a significant barrier to innovation. A new dynamic could emerge if CARB’s role evolved from passive regulator and reviewer to an active problem solver, reminiscent of the role CARB played in the development and adoption of the catalytic converter for cars.

3) One of the biggest barriers to greater use of bioethanol in low blends is NO_x and permeation emission issues. If apparent air emissions caused by low blend ethanol could be resolved, California would have more options in addressing greenhouse gas emissions and petroleum displacement. That could allow moving to an E 10 sooner rather than later (or not at all). And, based on the Midwest experience, an E 10 blend would allow for much faster and significantly greater reduction in petroleum consumption than would occur with an E 85 strategy alone.

Interestingly, ethanol has inherent characteristics that are better for air quality compared to petroleum derived gasoline, including reformulated gasoline. These include lower CO, HC, NO_x, and toxics emissions in addition to reduced lifecycle greenhouse gases (GHG) released (primarily CO₂). And ethanol's lower vapor pressure would indicate lower permeation and volatility compared to reformulated gasoline. The reported higher NO_x and permeation associated with low blend ethanol are at odds with what one expects from a shorter chain carbon fuel which is cleaner burning. An obvious question is to what extent is there an emission problem with ethanol endemic to the ethanol itself or is it fundamentally a question of gasoline formulation? And can the formulation be adjusted?

Note that gasoline is a complex blend of many different compounds. There are, for example, octane enhancers, anti-oxidants, deposit modifiers, surfactants, corrosion inhibitors, metal deactivators, etc. More fundamentally gasoline is composed of hundreds of hydrocarbon compounds encompassing aromatics, paraffins, olefins, etc. The proportion of hydrocarbons in any formulation varies, both between and within refiners, including by grade of gasoline, by state or region, seasonally, etc. Although there are quality standards for gasoline formulations (i.e. ASTM), specific information on any given formulation used by a refinery is proprietary and not available to the public.

I propose a targeted research effort to develop low ethanol blend gasoline formulation(s) that does not increase either evaporative or NO_x emissions. Although CARB and the petroleum industry have suggested that this is not feasible, there are indications that, in fact, it is. What is certain is that if we don't have a concerted effort, it will not happen.

Specifically I am suggesting collaboration between CEC, CARB, environmental groups, a transportation non profit and industry experts. The goal would be to develop a set of formulations that meet all performance and air emission requirements while insuring a financially viable result for industry. Note that my organization's work is based on a collaborative model of engagement with stakeholders. And this approach has proved very successful. But it involves going "outside the box" - in this case finding companies with products that may work or going into the lab and experimenting with formulations. Inviting industry into the process is important, and their contributions would accelerate the development of solutions. To be frank, the petroleum industry may not be interested in participating in such an effort as they have historically fought low blend ethanol efforts in other states. However, this effort need not be premised on their participation, although it is desirable. In fact, they may already know a solution. However, there would need to be some benefit for them to reveal it, as it is likely seen as working against their interest.

4) The focus of most biofuels interest has centered on ethanol, biodiesel and hydrogen. However, biomethane made from biogas generated by methane digesters and landfills is an important fuel that needs to be promoted as well. The CEC and the Governor's office recognize this biofuel as a potential source of supply but to date there has been no State funding to build a demonstration plant. Providing seed funding for a biomethane plant would be an important step. My organization has recently applied to EPA for funding to study such a plant both at a large Central Valley cheese plant and at a commercial dairy. It is recommended that specific incentives be developed and provided to both generators of the fuel and potential users such as trucking companies and government fleet vehicles.

There are other renewable fuels that offer advantages over "conventional" biofuels but few in California government are actively evaluating. These include di-methyl ether (DME), synthetic gasoline and butanol. DME, which can be readily made from many renewable sources, is much cleaner burning than diesel and typically has higher energy content than biodiesel. Although it requires some vehicle retrofitting to be compatible with existing diesel trucks and buses, it has near zero PM and very low NOx emissions.

Butanol is an alcohol fuel that has energy content equivalent to gasoline and is cleaner burning than gasoline. It also has a lower vapor pressure and potentially lower NOx emissions than ethanol in low blends. A patented production system has recently been developed that may also result in higher net energy yield compared to ethanol.

Synthetic gasoline made from methane is another novel biofuel that CEC should evaluate. Developed by a Santa Barbara company, the process is now moving to commercialization using natural gas from stranded wells as its initial feedstock. However, it could use biogas from anaerobic digesters as well with the advantage of turning a gaseous fuel into a liquid fuel with increased vehicle range and other benefits.

5) Finally, and perhaps most importantly, California does not grow any biofuel crops. California, because of its unique climate, geography and dominance of irrigated specialty crops, needs to devise its own biofuel paradigm. Unfortunately, there is almost no money from State sources and little federal money that would provide for even a modest research program to develop California biofuel crops/production systems. This is a critical need, one that should have been pursued years ago. My organization has been working on this issue for the last couple of years and has specific suggestions on how to achieve this. We are ready to provide a detailed implementation plan, should there be an interest by CEC.

Thank you for considering these comments.

Sincerely,

Allen J. Dusault
Program Director, Sustainable Agriculture